

ENGI 120 - Introduction to Engineering Design
Fall Semester 2012
OEDK Classroom 114 10:50-12:05 Tu/Th

INSTRUCTOR

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COURSE ADMINISTRATION

Textbook

The textbook for ENGI 120 is Engineering Design: A Project Based Introduction, 3rd edition; Clive L. Dym and Patrick Little; Wiley, 2009, ISBN 978-0-470-22596-7. It is available at the campus store.

Course Objectives and Outcomes

Students learn the engineering design process and use it to solve meaningful problems drawn from local hospitals and medical facilities, local companies and organizations, international communities, and around the Rice University campus. Teams of students evaluate design requirements and construct innovative solutions in the Oshman Engineering Design Kitchen.

Course objectives Students should learn:

1. To apply the engineering design process to meet the needs of a client.
2. To work collaboratively on a team to design an engineering solution.
3. To communicate the critical steps in the design process in written and oral/visual formats.

Course outcomes Students completing the course should be able to:

1. Successfully solve a client-based design challenge by following these critical steps in the engineering design process: a) Define a client's need, b) Complete a design context review, c) Establish design criteria, d) Brainstorm solutions, e) Select an appropriate solution using a Pugh Matrix, f) Prototype and build a physical solution, and g) Evaluate a solution against established design criteria.
2. Work collaboratively on an engineering team to complete an engineering design project.
3. Work collaboratively on an engineering team to write technical memos and present oral technical reports with supporting visuals.
4. Work safely in the OEDK.
5. Use a Gantt chart as a project management tool and critique a Gantt chart that lays out an engineering design process.

Class Time and Support

Class time will be used in a variety of ways, including short lectures, active learning, team meetings, and student oral presentations. Active engagement is expected of all students in ENGI 120. Dr. Saterbak will lead the lectures and some active learning exercises. Design teams are expected to work in class; apprentice leaders will be available to mentor teams as necessary. Faculty mentors will support teams in a number of ways, and students teams are expected to regularly interact with faculty mentors.

Team Formation and Expectations

Active, productive engagement is expected of all students. Teams will be formed based on student interest and skills. Students will work in their design team throughout the entire semester. Students will have design team meetings during most class periods. For this reason, attendance in class is expected of all students except for illness or family emergency. Design teams are also expected to meet outside of class. Each member of the design team is expected to contribute equally to the project. While types of contributions will vary, effort should be comparable. It is also important that regular team requirements rotate. For example, one person should not act as the recorder for every meeting; rather, everyone on the team should take turns with this job.

Peer evaluation of student design teams will be conducted using the online CATME system. Instructor and apprentice leader input will be gathered as well, using the process described below.

Honor Code Policy

Collaboration is essential for the success of this course and of your team; thus, collaboration is expected. It is important that the design work and communication assignments be spread out among the members of your team. The exam will reflect individual effort and will be pledged.

ASSIGNMENTS

Course Assignments and Schedule

Due dates for assignments in ENGI 120 are listed in Table 1. Most assignments for the course are the team-based technical memos, executive summary and oral presentations; these are described below. The take-home exam will be available on Thurs, October 25 and will be due on Thurs, November 1. Due dates for other deliverables, including OEDK training and prototype demonstrations, are also listed in Table 1.

Nine technical memos (TM) and one executive summary (ES) record the progress of the design teams. TMs are typically 1-2 pages in length; the ES is 8-10 pages in length. All written assignments should be uploaded to the Assignment section of Owlspace.

For a team containing five or six members, each TM should be authored by three students. (If a team drops to four members, then each TM can be authored by two or three students.) During the semester, each student must be an author on four to six TMs. Each member of the team must be an author on one of the first three TMs. The team should prepare a schedule with each team member and the TMs that each will author. Student authors can revise their TM and submit it for a regrade. The revised TM grade overwrites the previous grade.

Table 1 Assignments and Due Dates

Assignment Topic	Due Date and Time	Location
Complete <i>OEDK Access Form</i>	Fri, Aug 24, 4:00 pm	On-line
Complete <i>Team Preference Form</i>	Sun, Aug 26, 4:00 pm	On-line
Complete individual <i>Design Process Assessment</i>	Sun, Aug 26, 4:00 pm	On-line
TM 1: Problem statement	Mon, Sept 3, 4:00 pm	Owlspace
TM 1 Revision: Problem statement	Mon, Sept 10, 4:00 pm	Owlspace
TM 2: Design context review and bibliography	Mon, Sept 10, 4:00 pm	Owlspace

TM 3: Design criteria	Thurs, Sept 13, 4:00 pm	Owlspace
TM 2 Revision: Design context review and bibliography	Mon, Sept 17, 4:00 pm	Owlspace
CATME Evaluation I	Tues, Sept 18, 12 midn	CATME
TM 3 Revision: Design criteria	Thurs, Sept 20, 4:00 pm	Owlspace
TM 4: Brainstorming of design solutions	Thurs, Sept 20, 4:00 pm	Owlspace
TM 5: Evaluation of design solutions	Mon, Sept 24, 4:00 pm	Owlspace
TM 4 Revision: Brainstorming of design solutions	Thurs, Sept 27, 4:00 pm	Owlspace
TM 5 Revision: Evaluation of design solutions	Mon, Oct 1, 4:00 pm	Owlspace
TM 6: Final design plan	Mon, Oct 1, 4:00 pm	Owlspace
Oral Presentation I	Tues, Oct 2 & Thurs, Oct 4, in class	OEDK 114
Register for OEDK worktable	Friday, Oct 5, 4:00 pm	On-line
OEDK workshop tutorials	TBA, Oct 5 - Oct 15	OEDK
CATME Evaluation II	Tues, Oct 16, 12 midn	CATME
TM 6 Revision: Final design plan	Mon, Oct 22, 4:00 pm	Owlspace
TM 7: Testing plan	Mon, Oct 22, 4:00 pm	Owlspace
Prototype evaluation	Tues, Oct 23, in class	OEDK 114
TM 7 Revision: Testing plan	Mon, Oct 29, 4:00 pm	Owlspace
TM 8: Status report	Mon, Oct 29, 4:00 pm	Owlspace
Exam	Thurs, Nov 1, in class	OEDK
TM 8 Revision: Status report	Mon, Nov 5, 4:00 pm	Owlspace
Prototype evaluation	Tues, Nov 6, in class	OEDK 114
TM 9: Status report	Mon, Nov 12, 4:00 pm	Owlspace
TM 9 Revision: Status report	Mon, Nov 19, 4:00 pm	Owlspace
Oral Presentation II and Prototype Demonstration	Tues, Nov 27 & Thurs, Nov 29, in class	OEDK 114
CATME Evaluation III	Due at “final” time assigned by Registrar	CATME
TM 10: Participate in team closing activity	TBA	AL will complete
Executive Summary	Due at “final” time assigned by Registrar	Owlspace
Final Prototype	Due at “final” time assigned by Registrar	OEDK

Grading Policy

The final grade will be based on the percents shown in Table 2. All members of the team will receive the same grade for the executive summary, oral presentation I, oral presentation II and prototype demonstration, and quality of final prototype. All members of the team must author the executive summary (10% of final grade). Individual student performance will be assessed though the exam (10% of final grade) and the team participation grade. The grades for the technical memos and participation with faculty mentor will be based on both individual and team contributions, as described below.

Table 2 Calculation of Course Grade

Assignment	% of Final Grade
Technical memos 1-9 plus reflection	25%
Executive summary	10%
Oral presentation I	10%
Oral presentation II & prototype demo	15%
Exam	10 %
Team participation	10%
Participation with Faculty Mentor	5%
Quality of final prototype	15%

Each TM will be graded to 20 points. If a team chooses to revise their TM, the original grade will be overwritten with the revised memo grade. A tenth TM grade will be assigned based on participation with an end-of-the-semester reflection with your Apprentice Leader. Your TM grade will depend heavily on the TMs that you authored. Specifically, your TM grade will be calculated such that the points earned from the TMs you authored will be weighted twice that of the points earned from the TMs that you did not author. Overall, the TMs count for 25% of the final grade.

Oral presentations will be given two times during the semester. One person from each team will present. The grades for the presentation will count 10% and 15%, respectively. The quality of the final physical prototype will be evaluated based on the completed prototype and evidence of meeting the design criteria as documented in the executive summary. Overall, the quality of the final prototype counts 15%.

Teams are expected to meet with their faculty mentor 10 times (i.e., weekly) during the semester. Typically, two or three members of the team meet with the faculty mentor. Each meeting is expected to be 15-20 minutes in length; meetings will not occur during class time. Each student is expected to attend 5 meetings. Completion of this task will earn full credit for the participation with faculty mentor grade (5% of final grade).

A team participation score will be given three times during the semester and will range from 0 to 100%. The individual team participation grade is based on technical contribution, peer evaluation, apprentice leader input, instructor evaluation, self-evaluation, attendance, etc. Peer evaluation will be formally evaluated using the CATME software. Dr. Saterbak makes the final decision about a student's team participation score, which counts as 10% of the final grade.

No late assignments will be accepted without permission of the instructor before the assignment is due. Illness and family emergencies will be dealt with on an individual basis. Individual and team grades on assignments that are turned in late will be reduced 25% per day (including weekends).

Extra credit opportunities will be presented throughout the semester. Any extra credit will be added to individual efforts, such as the exam, or the final grade. Extra credit opportunities may include completing pre- and post-assessment inventories, attending special seminars, completing mid-term and final assessments of the class, etc. Opportunities will be announced in class.

COURSE SUPPORT

Faculty Mentor Support

Faculty mentors will support teams both in and out of class. These individuals are all gifted teachers and are a tremendous technical resource for teams in ENGI 120. These faculty are committed to helping your team solve its design challenge. The following are the faculty mentors:

Dr. Brent Houchens
houchens@rice.edu

Dr. Matthew Wettergreen
mattheww@rice.edu

Dr. Gary Woods
gwoods@rice.edu

Dr. Renata Ramos
Renata.Ramos@rice.edu

Apprentice Leader Support

Apprentice Leaders (AL) are developing their engineering leadership skills as part of the RCEL initiative. ALs are sophomore, junior, and senior students who will support teams both in and out of class. Each of the ALs will be assigned to one of each of the design teams as a coach.

OEDK Support

Undergraduate teaching assistants (TA's) will offer technical support in the OEDK once prototyping begins and continuing until the "exam" date assigned by the Registrar. Times will be posted at a later date.

Support for Writing Assignments

Writing mentors will assist student teams in preparing high-quality technical memos. As shown in Table 3, writing conferences will be available to all teams on the day preceding the due dates of the TMs, revised TMs, and ES. Conference times will be Sunday afternoon and evening for TMs due on Monday. Conference times will be Wednesday afternoon and evening for TMs due on Thursday. All writing conferences will be in the OEDK. Each team is expected to attend a writing conference when preparing each of the first three memos. When attending a writing conference, one or more of the authors is expected to attend. A complete draft of the TM or revised TM, including supporting numbers and necessary decisions, should be uploaded to Owlspace at least 24 hours prior to the writing conference times to give the mentors sufficient time to prepare for the conference. Additional information about expectations of TMs and writing conferences will be provided at a later time. For each TM, one revision is permitted.

Table 3 Writing Conference Times for TMs

Assignment	Due Date	Writing Conferences
TM 1	Mon, Sept 3	Sun, Sept 2
TM 1 Revision TM 2	Mon, Sept 10	Sun, Sept 9
TM 3	Thurs, Sept 13	Wed, Sept 12
TM 2 Revision	Mon, Sept 17	Sun, Sept 16
TM 3 Revision TM 4	Thurs, Sept 20	Wed, Sept 19
TM 5	Mon, Sept 24	Sun, Sept 23
TM 4 Revision	Thurs, Sept 27	Wed, Sept 26

TM 5 Revision TM 6	Mon, Oct 1	Sun, Sept 30
TM 6 Revision TM 7	Mon, Oct 22	Sun, Oct 21
TM 7 Revision TM 8	Mon, Oct 29	Sun, Oct 28
TM 8 Revision	Mon, Nov 5	Sun, Nov 4
TM 9	Mon, Nov 12	Sun, Nov 11
TM 9 Revision	Mon, Nov 19	Sun, Nov 18
Executive Summary	Due at time assigned by Registrar	Announced later

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Allen Center.